



ELECTRODE-LESS DIELECTROPHORESIS FOR POLARIZABLE PARTICLES

Cross-Reference To Related Applications

This application is a continuation-in-part of U.S. Patent Application Serial No. 60/163,523 filed November 4, 1999, which is incorporated herein in its entirety.

Governmental Rights

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Background of the Invention

1. Field of the Invention

The present invention relates generally to microfluidic chips and methods for performing electrodeless purification, concentration, trapping and launching of polarizable particles or molecules in fractionating devices or chemical/amplification/detection devices by dielectrophoresis. The novel devices utilize dielectrophoresis technology achieved by using insulating constrictions without the use of metal electrodes and exploiting low frequency polarizability of particles or molecules. In particular, the polarizable particles and molecules include but are not limited to, cells, viruses, polymer particles, colloids and molecules such as proteins, peptides, carbohydrates, and polynucleotides, in particular, single-stranded or double-stranded DNA or RNA. The invention also relates to a device for thermocycling polarizable particles, in particular for amplification of nucleic acids. Specifically, the invention involves trapping minute amounts of nucleic acids in a microfabricated, dielectrically focused device, thermocycling them, and releasing them for fractionation or analysis.

2. Description of the Related Art

One of the great challenges in biotechnology is how to move and concentrate molecules in a micro-fabricated environment. One possible technique is dielectrophoresis (DEP) in which the translation of neutral matter is caused by